STATE OF CALIFORNIA

The Resources Agency

Department of Water Resources

BULLETIN No. 16-72

WEATHER MODIFICATION OPERATIONS IN CALIFORNIA

October 1, 1971 - September 30, 1972

AUGUST 1973

NORMAN B. LIVERMORE, JR.
Secretary for Resources
The Resources Agency

RONALD REAGAN
Governor
State of California

WILLIAM R. GIANELLI
Director
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ABSTRACT

Within the reporting period, October 1, 1971, through September 30, 1972, nine licensees conducted weather modification projects in 12 locations in California. All projects used silver iodide in various forms as the active agent to increase precipitation. The Lake Almanor, Santa Clara County, and Upper Santa Ana River Projects--inactive during the 1970-71 water year--were reactivated during the 1971-72 season. Monterey County and Yolo County Projects were begun late in the season on an emergency basis.

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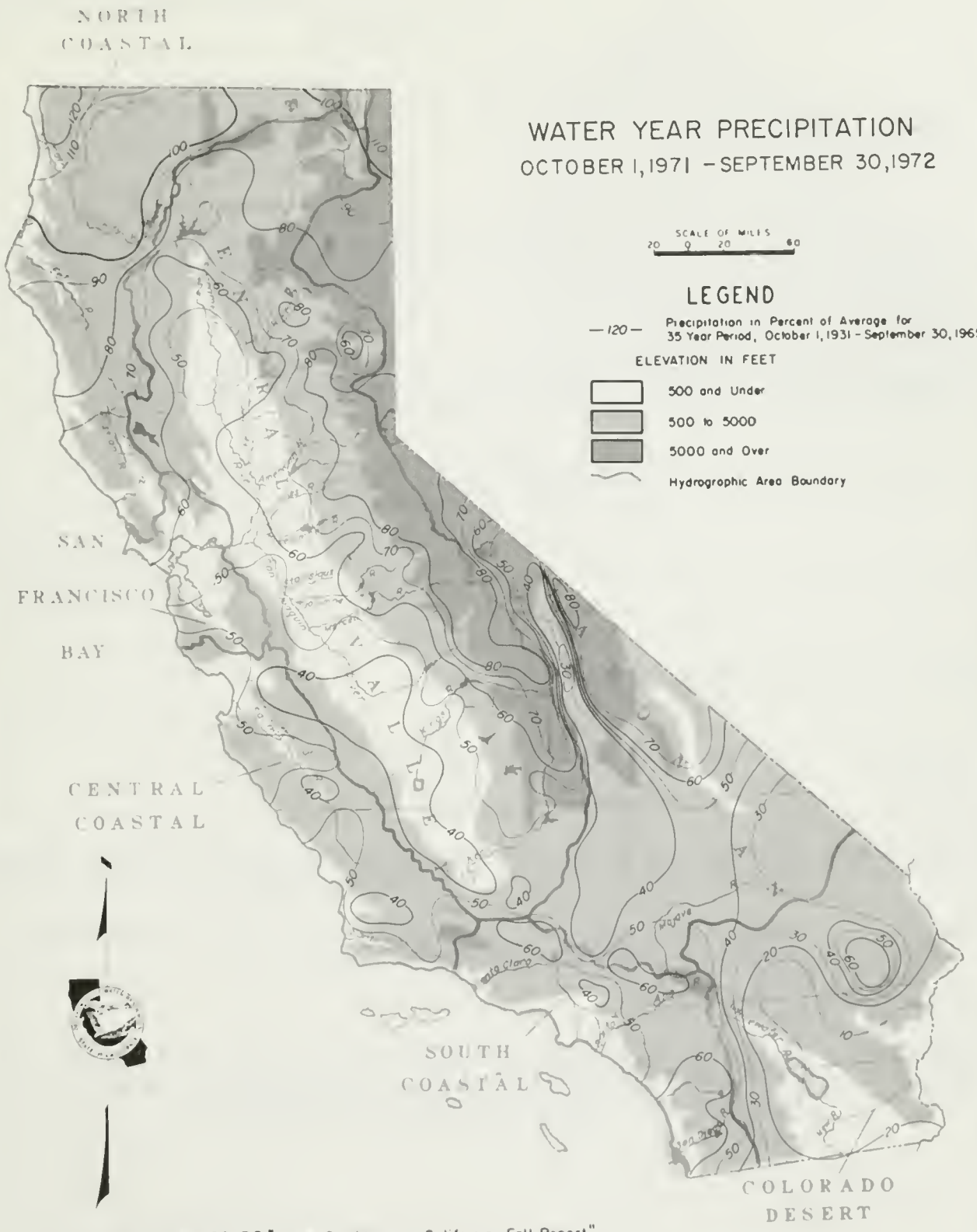


NOTE: Bulletin No. 120-72 "Water Conditions in California: Fall Report", Dated October 1972, Provides Detailed Precipitation Data For The 1971 -72 Water Year

WEATHER MODIFICATION OPERATIONS

Weather modification operations were conducted in 12 areas of the State during the 1971-72 water year by nine licensed operators. All projects used silver iodide in various forms as the active agent to increase precipitation.

Silver iodide has been listed nominally as the active agent whenever it was part of the dispersed material. However, when a solution of silver iodide and sodium iodide in acetone was burned, the active agent has been considered to have probably been a complex salt of silver iodide and sodium iodide.

Three projects that were inactive during the 1970-71 season were reactivated in the 1971-72 season. These were the Lake Almanor Project, the Santa Clara County Project, and the Upper Santa Ana River Project.

Two projects, Monterey County and Yolo County, were instituted late in the season on an emergency basis.

Project 1-72-1: UPPER SAN JOAQUIN RIVER BASIN

Licensee:	North American Weather Consultants
Client:	Southern California Edison Company
Target Area:	Drainage area of the upper San Joaquin River and tributary streams above Southern California Edison Power House No. 3
Purpose:	By increasing snowfall, to increase water stored behind reservoirs used for generation of electrical power
Active Agent:	Silver iodide
Dispersal Method:	Ground-based generators burning solution of silver iodide and ammonium iodide in acetone and aircraft seeding using pyrotechnics that disperse silver iodide smoke when burned

(Continued)

Project 1-72-1
UPPER SAN JOAQUIN RIVER BASIN (continued)

No.	Location	Elev.	Hours of Operation											
			1971			1972								
			Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Total
SURFACE GENERATORS														
1	Florence	7,450	0	0	75:00	0	0	0	69:15	45:45	51:45	18:15	17:15	21:45	299:00
2	Vermilion	7,475	2:00	19:30	92:00	6:45	27:00	0	80:45	45:45	50:00	28:15	17:15	21:45	391:00
3	China Peak	8,600	3:00	19:30	83:15	6:45	27:00	0	80:45	41:15	4:00	9:30	5:00	21:45	301:45
4	Mt. Given	9,760	9:00	19:30	108:30	6:45	27:00	0	80:45	45:45	47:45	31:15	17:15	21:45	415:15
5	Huntington	7,000	3:00	19:30	97:45	6:45	27:00	0	80:45	41:15	7:15	9:30	4:30	21:45	319:00
6	Mammoth Pool	3,200	8:30	19:30	92:00	6:45	27:15	0	150:00	130:15	7:45	9:30	0	21:45	473:15
7	Shaver	5,400	3:00	19:30	69:30	6:45	27:00	0	80:45	40:15	7:15	9:30	10:30	21:45	295:45
8	Pine Ridge	4,080	0	6:30	49:00	6:15	10:30	0	73:45	21:45	0	0	0	0	167:45
9	Auberry	2,080	0	13:30	60:15	6:15	27:00	0	73:45	21:15	0	0	0	0	202:00
10	Toll House	1,920	0	0	15:15	6:15	27:00	0	74:45	0	0	0	0	0	123:15
11	South Fork	2,640	0	19:15	73:45	6:15	27:00	0	78:30	0	0	0	0	0	204:45
12	Bass Lake	3,000	0	12:00	28:30	4:00	0	0	76:30	0	0	0	0	0	121:00
Subtotal - Surface Generators			28:30	168:15	844:45	69:30	253:45	0	1,000:15	433:15	175:45	115:45	71:45	152:15	3,313:45
Aircraft														
Hours of operation			0	0	0	0	0	0	0	3:59	6:29	2:28	4:54	2:59	20:49
Total Hours - Aircraft and Surface Generators			28:30	168:15	844:45	69:30	253:45	0	1,000:15	437:14	182:14	118:13	76:39	155:14	3,334:34
Number of storms			2	3	10	1	1	0	5	7	13	5	7	4	58
Number of days on which seeded			2	3	11	1	2	0	10	11	13	6	7	5	71
AgI used by aircraft (grams)			0	0	0	0	0	0	0	608.0	1,402.2	709.0	961.0	372.0	4,052.2
Total AgI used by aircraft and surface generators (grams)			171.0	1,009.5	5,068.5	417.0	1,522.5	0	6,001.5	3,207.5	2,456.7	1,403.5	1,391.5	1,285.5	23,924.7

Rate of dispersal, AgI
Aircraft: variable
Surface generators: 6 grams per hour per generator

Project 1-72-2: SANTA BARBARA COUNTY

Licensee: North American Weather Consultants

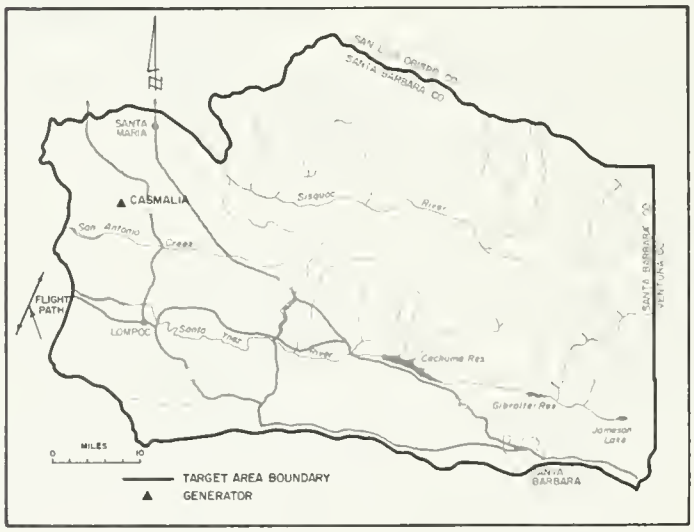
Client: Naval Weapons Center, China Lake

Target Area: Santa Barbara County

Purpose: To test operations for modifying precipitation in precipitation bands

Active Agent: Silver iodide

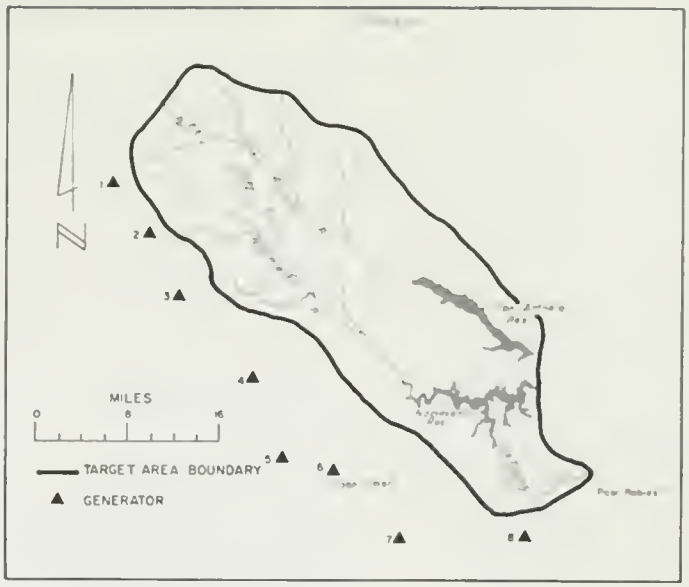
Dispersal Method: Ground-based and aircraft generators burning a solution of silver iodide and ammonium iodide in acetone



	Elevation	Hours of Operation			
		Dec.	Jan.	Feb.	Total
Ground Generator					
Casmalia	300	2:30	0	0	2:30
Aircraft	-	1:59	0	2:27	4:26
Total Hours	-	4:29	0	2:27	6:56
Number of storms		2	0	1	3
Number of days on which seeded		2	0	1	3
AgI used (grams)		3,444.8	0	1,058.4	4,503.2

Rate of dispersal (grams per minute)
Ground generator: 14.2
Aircraft: Dec. 11.7
Feb. 7.2

Project 1-72-3: MONTEREY COUNTY PROJECT



Licensee: North American Weather Consultants

Client: Monterey County Flood Control and Water Conservation District

Target Area: Drainage basins above Nacimiento and San Antonio Reservoirs

Purpose: To increase water supply behind reservoirs by increasing precipitation

Active Agent: Silver iodide

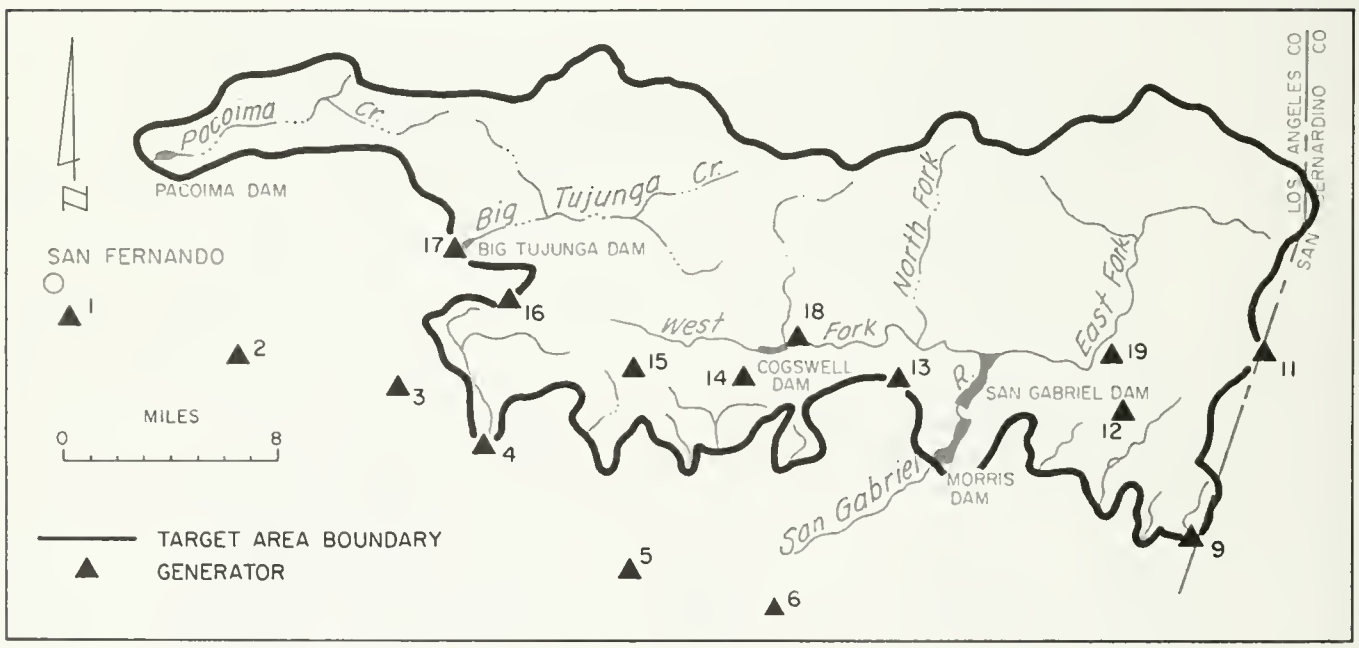
Dispersal Method: Ground-based generators burning a solution of silver iodide and ammonium iodide in acetone

Generators		Elevation	Hours of Operation		
No.	Location		March	April	Total
1	Lucia	200	5:30	43:45	49:15
2	Pacific Valley	200	0	66:00	66:00
3	Gorda	200	3:00	43:30	46:30
4	Ragged Point	200	0	66:45	66:45
5	Piedras Blancas	200	0	63:00	63:00
6	San Simeon	200	0	65:00	65:00
7	Cambria	200	0	65:00	65:00
8	Cambria, 10E	1,500	0	30:30	30:30
	Total		8:30	443:30	452:00

Number of storms	1	3	4
Number of days on which seeded	1	5	6
AgI used (grams)	51.0	2,661.0	2,712.0
Rate of dispersal (grams per hour per generator)	-	6	-

Project 18-72-1: SAN GABRIEL MOUNTAINS

Licensee:	Los Angeles County Flood Control District
Client:	Same
Target Area:	Southern slopes of the San Gabriel River, Big Tujunga Creek, and Pacoima Creek drainage basins tributary to the district's reservoirs
Purpose:	To increase water supply behind reservoirs by increasing precipitation
Active Agent:	Silver iodide
Dispersal Method:	Ground-based generators using a 2% solution of silver iodide and ammonium iodide in acetone, producing 10^{12} to 10^{13} nuclei per second (10^{14} to 10^{16} nuclei per gram of AgI)



Project 18-72-1: SAN GABRIEL MOUNTAINS (Continued)

Generator No.	Location	Elevation	Hours of Operation Dec.	Jan.	Feb.	Mar.	Apr.	May	Total
1	Pacoima Spreading Grounds	930	0	0	0	0	0	0	0
2	La Tuna Debris Basin	1,160	0	0	0	0	0	0	0
3	Pickens Patrol Station	1,600	14:00	0	0	0	0	27:30	41:30
4	Devils Gate Dam	1,090	24:45	0	0	0	0	28:15	53:00
5	Eaton Spreading Basin	540	28:15	0	0	0	0	0	28:15
6	Longden Yard	356	0	0	0	0	0	0	0
9	Thompson Creek Dam	1,800	0	0	0	0	0	0	0
11	Mt. Baldy Guard Station	4,275	0	0	0	0	0	0	0
12	Tanbark Flats	2,750	4:15	0	0	0	0	0	4:15
13	Pine Mountain	4,100	28:30	0	0	0	8:30	0	37:00
14	Spring Camp	4,655	15:30	0	0	0	8:30	28:30	52:30
15	Mt. Wilson	5,709	0	0	0	0	0	0	0
16	Red Box Ranger Station	4,625	13:15	0	0	0	0	0	13:15
17	Big Tujunga Dam	2,315	1:15	0	0	0	8:30	0	9:45
18	Cogswell Dam	2,300	30:30	0	0	0	8:15	28:30	67:15
19	San Gabriel Canyon, East Fork Ranger Station	2,075	11:00	0	0	0	0	27:30	38:30
	Total		171:15	0	0	0	33:45	140:15	345:15
Number of storms			3	0	0	0	1	1	5
Number of days on which seeded			4	0	0	0	1	2	7
AgI used (grams)			1,027.5	0	0	0	202.5	841.5	2,071.5
Rate of dispersal (grams per hour per generator)			6						

Project 21-72-1: UPPER KINGS RIVER BASIN

Licensee: Atmospherics Incorporated

Client: Kings River Conservation District

Target Area: Upper Kings River Basin

Purpose: To increase the water supply behind Pine Flat Dam by increasing precipitation

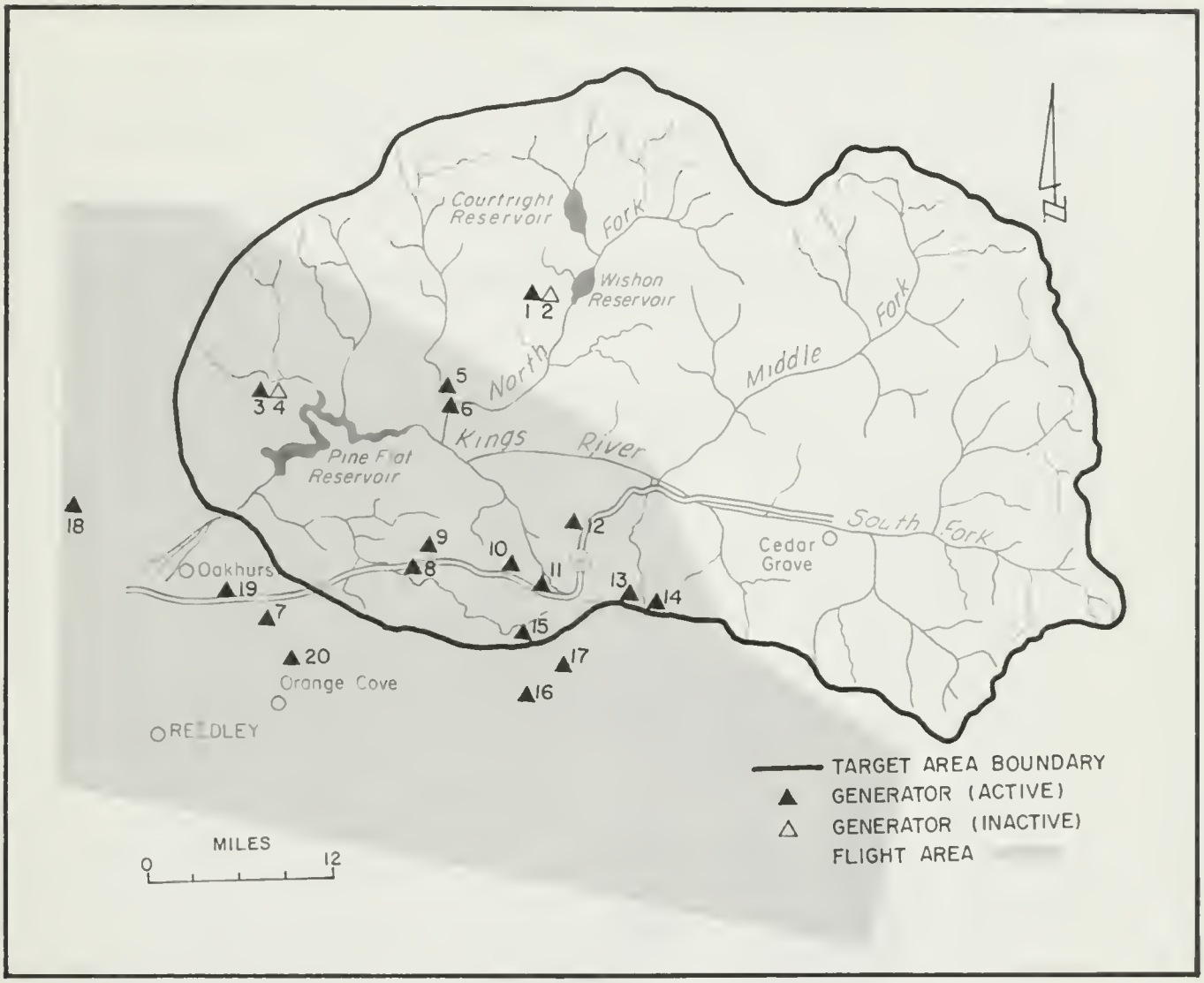
Active Agent: Silver iodide

Dispersal Method: Ground-based generators burned a solution of silver iodide and ammonium iodide in acetone; pyrotechnics used occasionally to give a silver iodide smoke; aircraft operations released silver iodide smoke by use of pyrotechnic devices.

Surface Generator No.	Location	Elev.	Hours of Operation 1971 Oct.	Nov.	Dec.	1972 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Total
1	Wishon Dam #1	7,000	0	13.2	12.6	5.5	0	0	3.2	0	0	0	0	0	34.5
2	Wishon Dam #2	7,000	0	0	0	0	0	0	0	0	0	0	0	0	0.0
3	Trimmer #1	1,250	0	0	14.5	18.2	14.3	0	0	0	0	0	0	0	47.0
4	Trimmer #2	1,250	0	0	0	0	0	0	0	0	0	0	0	0	0.0
5	Balch Camp #1	1,300	0	18.5	38.4	11.7	14.3	0	7.5	0	0	0	0	0	90.4
6	Balch Camp #2	1,300	0	0	0	0	0	0	6.8	0	0	0	0	0	6.8
7	Hackett Ranch	500	0	0	20.5	15.7	0.8	0	4.4	0	0	0	0	0	41.4
8	Millview	1,900	0	27.7	68.0	0	0	0	2.8	0	0	0	0	0	98.5
9	Sierra Inn	2,320	0	26.4	73.5	0	21.1	0	27.6	0	0	0	0	0	148.6
10	Heliport	4,500	0	27.2	51.7	0	0	0	0	0	0	0	0	0	78.9
11	Sequoia Lake	5,600	0	28.0	74.0	0	0	0	10.8	0	0	0	0	0	112.8
12	Cherry Gap	6,800	0	26.5	76.8	0	0	0	9.3	0	0	0	0	0	112.6
13	Quail Flat	6,900	0	0	0	0	0	0	9.3	0	0	0	0	0	9.3
14	Kings Canyon Overlook	7,100	0	26.0	24.0	0	0	0	9.3	0	0	0	0	0	59.3
15	Pinehurst	4,100	0	10.7	20.2	22.6	25.4	0	15.0	0	0	0	0	0	93.9
16	Badger	3,000	0	9.6	53.1	22.7	0	0	31.1	0	0	0	0	0	116.5
17	Sierra Glen	3,100	0	0	21.9	0	0	0	0	0	0	0	0	0	21.9
18	Radar	400	0	0	19.8	0	0	0	0	0	0	0	0	0	19.8
19	Reedley	700	0	0	58.9	21.5	24.5	0	14.1	0	0	0	0	0	119.0
20	Orange Cove	500	0	0	0	0	0	0	30.2	0	0	0	0	0	30.2
Subtotal, Surface Operation: Acetone			0.0	213.8	627.9	117.9	100.4	0.0	181.4	0.0	0.0	0.0	0.0	0.0	1,241.4
Pyrotechnic			0.0	0.0	0.2[a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Subtotal, Hours of Aircraft Operation			1.8	6.0	9.4	2.0	4.0	0.0	9.5	8.4	6.9	2.2	7.8	5.8	63.8
TOTAL Hours of Surface and Air Operation			1.8	219.8	637.5	119.9	104.4	0.0	190.9	8.4	6.9	2.2	7.8	5.8	1,305.4
AgI Used (grams) Aircraft Operation Acetone			0.0	3,207.0	9,418.5	1,768.5	1,506.0	0.0	2,721.0	0.0	0.0	0.0	0.0	0.0	18,621.0
Pyrotechnic			0.0	0.0	15.0[a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
AgI Used (grams) Aircraft Operation			135.0	450.0	729.0	150.0	300.0	0.0	741.0	1,519.0	1,623.0	546.0	1,341.0	510.0	8,044.0
Total AgI Used			135.0	3,657.0	10,162.5	1,918.5	1,806.0	0.0	3,462.0	1,519.0	1,623.0	546.0	1,341.0	510.0	26,680.0
Rate of dispersal: Surface - 15 grams of AgI per hour per generator; Aircraft- variable, (approximately 75 grams per hour through April)															
Number of storms			1	3	8	3	1	0	7	8	11	5	12	5	64
Number of flights			2[b]	3[b]	5[b]	2[b]	2[b]	0[b]	7[b]	8[c]	11[c]	5[c]	13[c]	6[c]	64
Number of days on which seeded			2	4	14	5	3	0	8	8	11	5	12	5	77

a/ Surface pyrotechnic operation from site of generator No. 12
b/ Within flight area
c/ Within target area

Project 21-72-1: UPPER KINGS RIVER BASIN (Continued)



Project 21-72-2: YOLO COUNTY PROJECT

Licensee: Atmospherics Incorporated

Client: Yolo County Flood Control District

Target Area: Lake County - Drainage Area of Clear Lake

Purpose: To increase water supply in Clear Lake by increasing late season precipitation

Active Agent: Silver iodide

Dispersal Method: Aircraft operations using pyrotechnics to produce a smoke of silver iodide

	March	April	May	Total
Number of hours of operation	4.2	7.2	1.9	13.3
AgI released (grams)	435	657	261	1,353
Number of storms	2	2	1	5
Number of flights	3	6	2	11
Number of days operated	2	2	1	5

Project 22-72-1: UPPER SANTA ANA RIVER WATERSHED

Licensee: San Bernardino Valley Municipal Water District

Client: Same

Target Area: Upper Santa Ana River Watershed

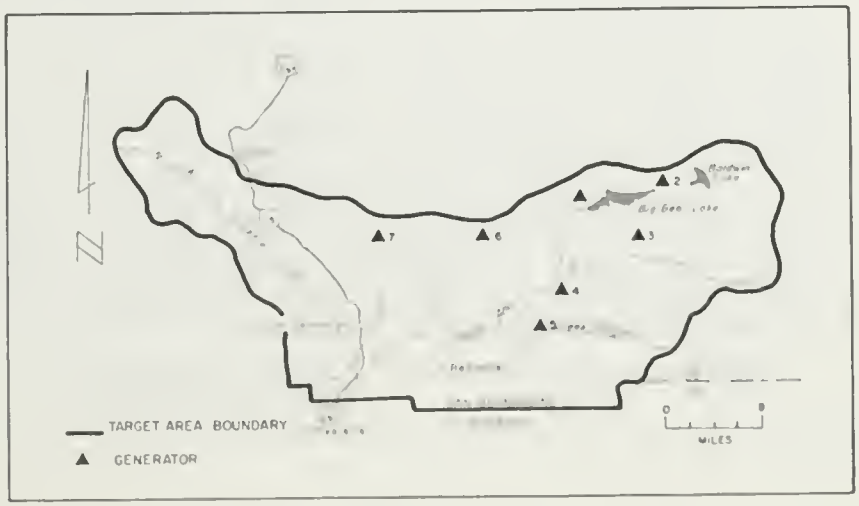
Purpose: To increase water for municipal and recreational use by increasing precipitation

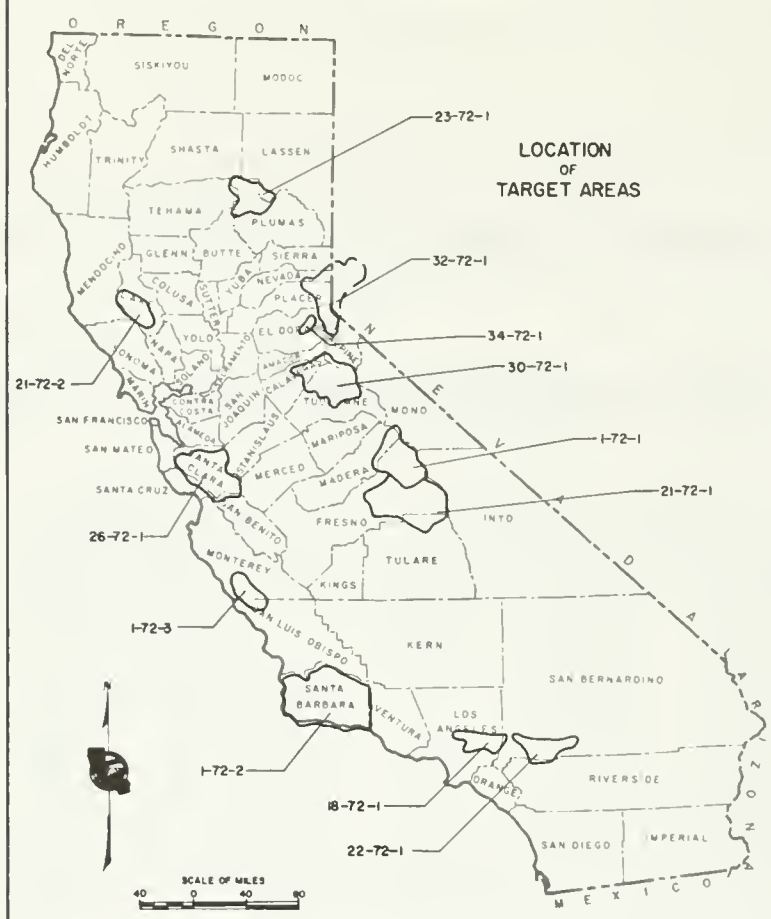
Active Agent: Silver iodide

Dispersal Method: Ground-based generators burning a solution of silver iodide and sodium iodide in acetone solution

Generator		Elevation	Hours of Operation*			
No.	Location		Dec.	Jan.	Feb.	Total
1	Big Bear Lake	6,815	24:00	0	0	24:00
2	Big Bear City	6,850	0	0	0	0
3	Sugar Loaf	7,200	0	0	0	0
4	Camp Angelus	6,600	0	0	0	0
5	Forest Falls	6,000	24:00	0	0	24:00
6	Running Springs	6,230	0	0	0	0
7	Lake Arrowhead	5,250	0	0	0	0
	Total		48:00	0	0	48:00
Number of storms			1	0	0	1
Number of days on which seeded			2	0	0	2
AgI used (grams)			1,236	0	0	1,236
Rate of dispersal (grams per hour per generator)			25.75			

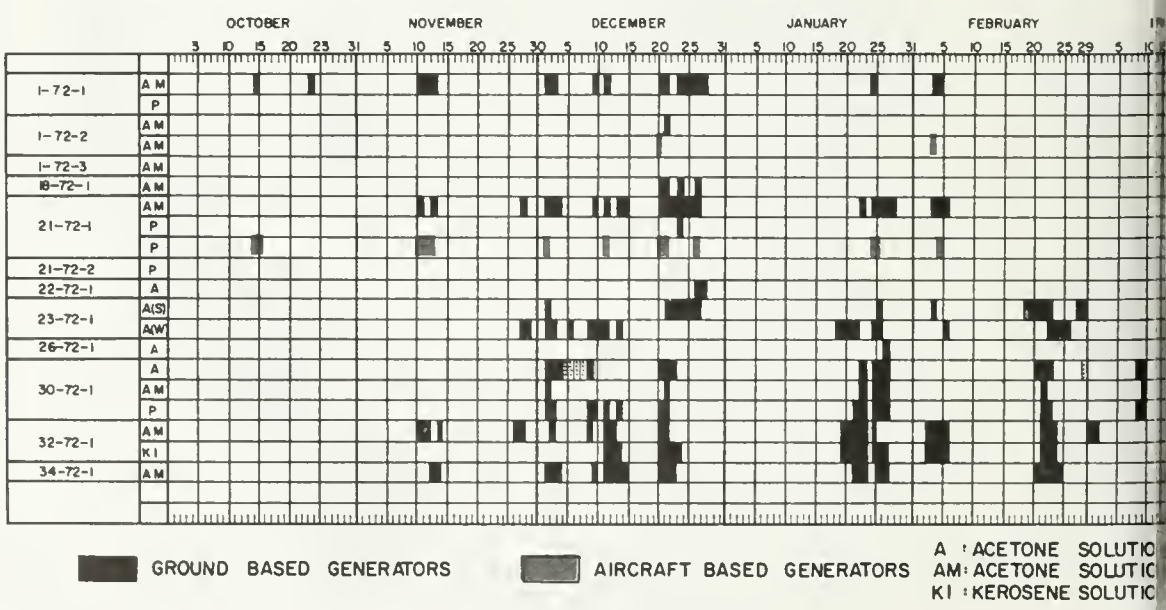
* This was a randomized project (one in which 50 percent of the storms were seeded on a chance basis). Only one storm was seeded.





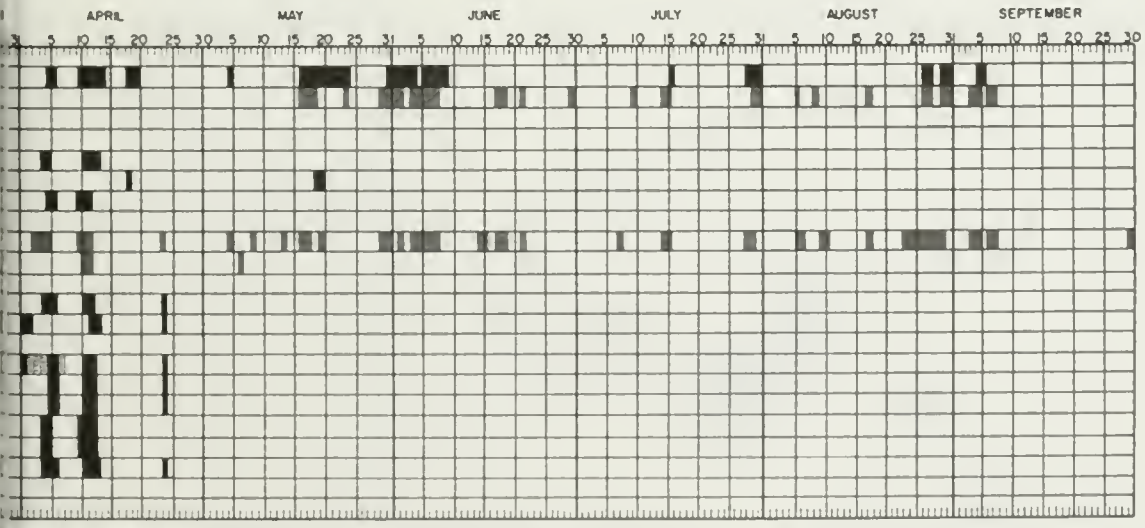
PLATE

PROJECT No	LICENSE No	YEAR 1971	YEAR 1972	LICENSEE
1-72-1	1	X	X	North American Weather Consultants Santa Barbara Municipal Airpo Goleta, California 93017
1-72-2	1	X	X	North American Weather Consultants
1-72-3	1	X	X	North American Weather Consultants
	5	X	X	Water Resources Development Weather Modification Projects 611 South Palm Canyon Drive Suite 216 Palm Springs, California 922
	12	X	X	Precipitation Control Company 105 Pierce Street Taft, California 93268
18-72-1	18	X	X	Los Angeles County Flood Co P.O. Box 2418, Terminal Ann Los Angeles, California 900
21-72-1	21	X	X	Atmospherics, Incorporated 5652 E. Dayton Avenue Fresno, California 93727
21-72-2	21	X	X	Atmospherics, Incorporated
22-72-1	22	X	X	San Bernardino Valley Municip 1350 South E Street P.O. Box 5906 San Bernardino, California 9
23-72-1	23	X	X	Pacific Gas and Electric Com 245 Market Street San Francisco, California 94
	24	X	X	International Weather Control, 40 West First Street Suite 104 Reno, Nevada 89501



THER MODIFICATION PROJECTS IN CALIFORNIA: 1972 WATER YEAR

	CLIENT	PROJECT No.	LICENSE No.	YEAR 1971	YEAR 1972	LICENSEE	CLIENT
	Southern California Edison Company		25	X	X	A R C Service Corporation 2956 C Street San Diego California 92102	Licensee inactive this water year
	U S Naval Weapons Center China Lake	26 72	26	X	X	Santa Clara County Flood Control and Water District 15420 Alamaden Expressway San Jose California 95118	Santa Clara County Flood Control and Water District
	Monterey County Flood Control and Water Conservation District		27	X	X	Vista Irrigation District P O Box 1088 Vista California 92083	Licensee inactive this water year
	Licensee inactive this water year		29	X	X	World Weather Incorporated P O Box 22250 Sacramento California 95822	Licensee inactive this water year
	Licensee inactive this water year	30 72 1	30	X	X	Fresno State College Foundation Atmospheric Water Resources Research 4831 East Shields Avenue Fresno California 93726	Fresno State College Foundation Atmospheric Water Resources Research
	Los Angeles County Flood Control District	32 72 1	32	X	X	Desert Research Institute University of Nevada System Stead Facility Reno, Nevada 89507	Division of Atmospheric Water Resources Management U S Bureau of Reclamation
	Kings River Conservation District	34 72 1	34	X	X	Sacramento Municipal Utility District P O Box 15830 Sacramento, California 95813	Sacramento Municipal Utility District
	Yolo County Flood Control District		35	X		Santiago Engineering Incorporated 1540 East Edinger Street Suite E Santa Ana, California 92705	Licensee inactive this water year
	San Bernardino Valley Municipal Water District		36	X	X	Wem-Cor, Incorporated 390 Grand Avenue Oakland, California 95610	Licensee inactive this water year
	Pacific Gas and Electric Company		37	X	X	Sierra Research Corporation Environmental Systems Group P O Box 3007 Boulder Colorado 80303	Licensee inactive this water year
	Licensee inactive this water year		38		X	Jeffery System of Weather Modification 634 South Gramercy Place - Suite 500 Los Angeles California 90005	Licensee inactive this water year



AND SODIUM IODIDE USED
AND AMMONIUM IODIDE USED
AND ISOPROPYLAMINE USED

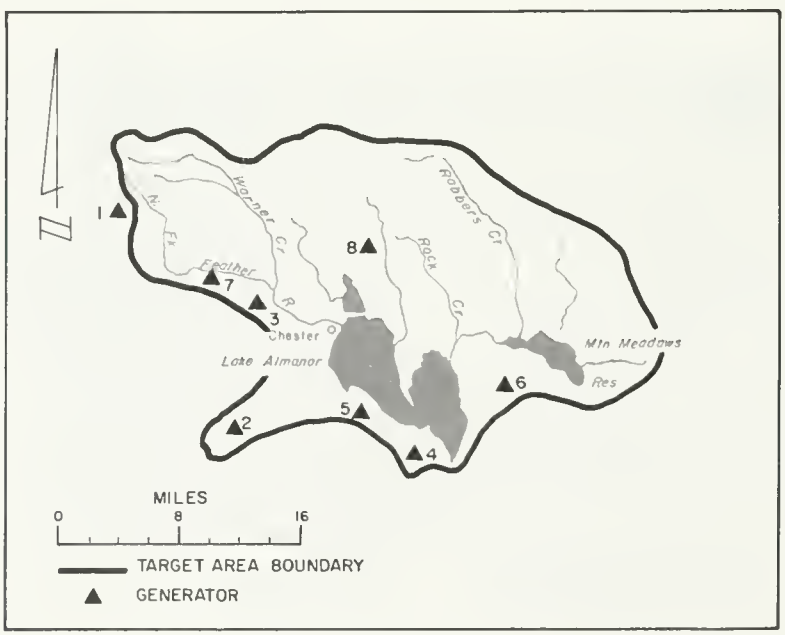
P: PYROTECHNICS USED.
(S): SOUTH GENERATOR GROUP.
(W): WEST GENERATOR GROUP.

MALFUNCTION

Project 23-72-1: LAKE ALMANOR

Licensee:	Pacific Gas and Electric Company
Client:	Same
Target Area:	Drainage basin of Lake Almanor, Butt Valley, and Mountain Meadows Reservoir within the drainage basin of the North Fork of the Feather River
Purpose:	To increase the water supply for power production by increasing precipitation which occurs as snow, and to determine the effectiveness of cloud seeding.
Active Agent:	Silver iodide
Dispersal Method:	High-elevation, radio-controlled ground generators burning a solution of silver iodide and sodium iodide in acetone.*

*Generator operation was grouped as south and west. The south group was initially randomized during "cold southerly" storms. If seeding did occur, it occurred during the first 11 hours. No seeding took place in the 12th hour. Then the chance decision on the next 12-hour period was made. Randomization was based on the overall expectation that 50 percent of the 12-hour periods would be seeded and 50 percent would not. Later, because of a dry season throughout California, the southerly storms were not randomized. The west generator group operated for the "cold westerly" storms and randomization was not part of this operation. The total hours of operation varied between generators within a group because certain of them were not always operable.



Generator No.	Generator Location	Elev.	Hours of Operation* Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
			South Generator Group						
2	Butt Mountain	6,100	0	55:10	4:24	98:40	15:00	66:15	239:29
3	Stover Mountain	6,000	0	55:10	0	22:00	15:00	83:05	175:15
4	Ohio Ridge	6,100	0	66:35	0	65:40	15:00	66:10	213:25
5	Keefer Ridge	5,000	0	66:35	4:24	98:40	15:00	44:00	228:39
6	Dyer Mountain	7,450	0	66:35	4:24	98:40	15:00	83:05	267:44
7	Feather River Meadows	5,444	0	55:10	4:24	22:00	15:00	83:05	179:39
	SUBTOTAL		0	365:15	17:36	405:40	90:00	425:40	1,304:11
			West Generator Group						
1	Christie Hill	6,700	0	62:00	76:36	0	21:35	36:45	196:56
2	Butt Mountain	6,100	11:00	11:00	76:36	87:15	21:35	25:45	233:11
3	Stover Mountain	6,000	11:00	51:00	65:36	74:15	21:35	36:45	260:11
5	Keefer Ridge	5,000	11:00	93:00	76:36	87:15	21:35	14:50	304:16
7	Feather River Meadows	5,444	11:00	62:00	76:36	43:15	21:35	36:45	251:11
8	Mud Creek Butte	6,100	11:00	93:00	76:36	44:00	21:35	0	246:11
	SUBTOTAL		55:00	372:00	448:36	336:00	129:30	150:50	1,491:56
TOTAL SOUTH AND WEST GROUP			55:00	737:15	466:12	741:40	219:30	576:30	2,796:07
Number of storms			1	9	2	5	2	4	23
Number of days on which seeded			2	14	6	12	3	9	46
AgI used (grams)									
South Generators			0	9,277.4	447.0	10,303.9	2,286.0	10,812.0	33,126.3
West Generators			1,397.0	9,448.8	11,394.5	8,534.4	3,289.3	3,831.11	37,895.1
Total AgI used (grams), South and West Generator Groups			1,397.0	18,726.2	11,841.5	18,838.3	5,575.3	14,643.1	71,021.4
Rate of Dispersal (all generators, grams of AgI per hour per generator)			25.4						

*To the nearest minute

Project 26-72-1: SANTA CLARA COUNTY PROJECT

Licensee: Santa Clara County Flood Control and Water District

Client: Same

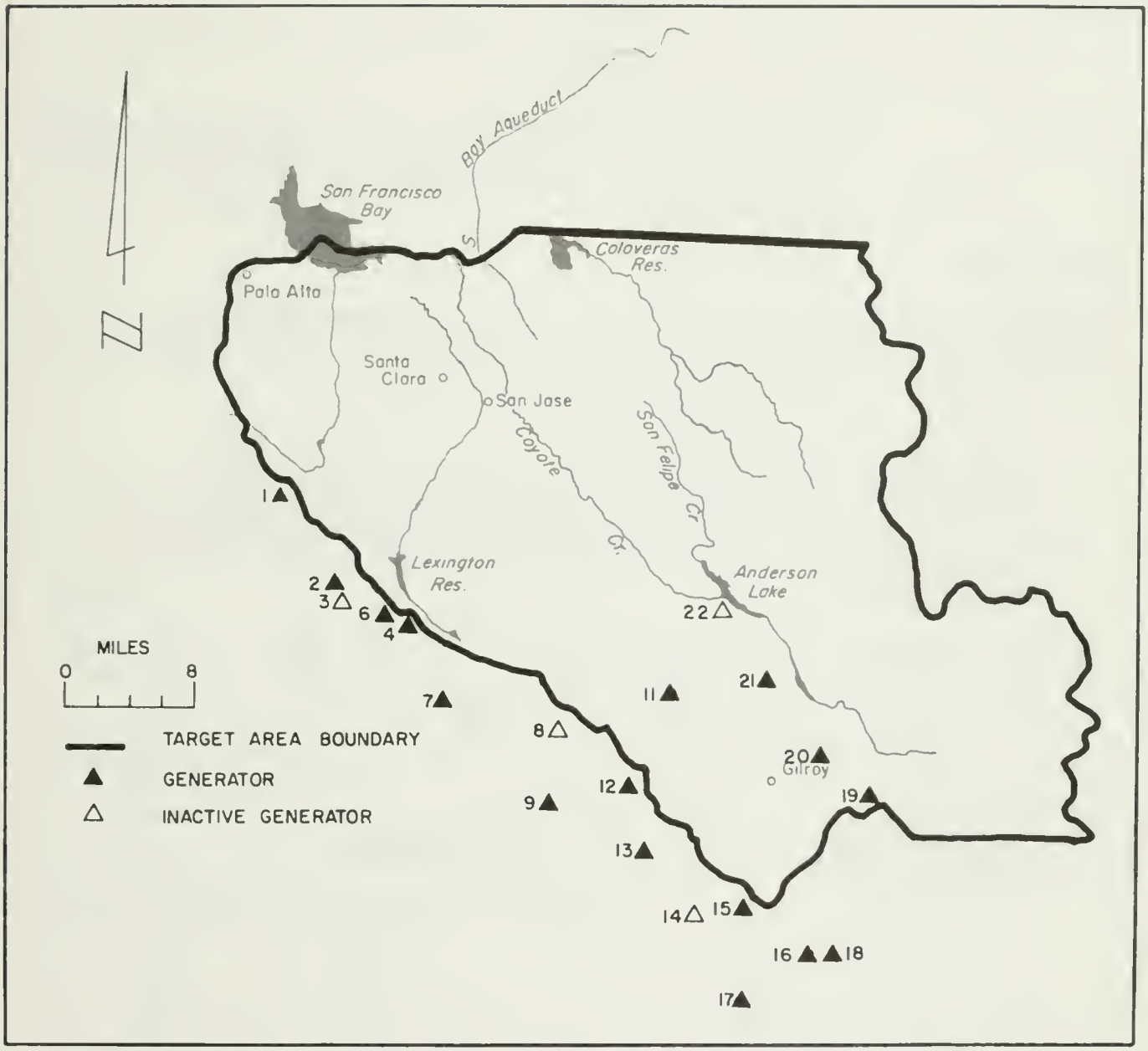
Target Area: Santa Clara County

Purpose: To increase precipitation and water supply behind district reservoirs

Active Agent: Silver iodide

Dispersal Methods: Modified starfire ground generators burning an acetone solution of silver iodide and sodium iodide in acetone

Generator		Elev.	Hours of Operation			
No.	Location		Dec.	Jan.	Feb.	Total
1	Saratoga Gap	2,600	0	2:30	0	2:30
2	Los Gatos 4SW	2,250	0	2:40	0	2:40
3	Redwood Estates	1,750	0	0	0	0
4	Laurel 2N	1,590	0	3:00	0	3:00
6	Glenwood	1,680	0	3:15	0	3:15
7	Laurel	600	0	3:10	0	3:10
8	Corralitos-Eureka Canyon	1,650	0	3:10	0	3:10
9	Corralitos	250	0	0	0	0
11	San Martin, 3W	765	0	3:50	0	3:50
12	Hecker Pass	1,200	0	3:05	0	3:05
13	Watsonville	125	0	3:05	0	3:05
14	Aromas	100	0	3:15	0	3:15
15	Soda Lake	600	0	0	0	0
16	San Juan Bautista	200	0	0	0	0
17	Fremont Peak	400	0	0	0	0
18	San Juan Bautista, Duncan Road	225	0	0	0	0
19	Pacheco Pass	350	0	0	0	0
20	Gilroy 2NE	300	0	0	0	0
21	San Martin 2E	340	0	0	0	0
22	Anderson Reservoir	600	0	0	0	0
	TOTAL		0	31:00	0	31:00
Number of storms seeded			0	1	0	
Number of days on which seeded			0	1	0	
Silver iodide used (grams)			0	775	0	775
Rate of Dispersal (grams of silver iodide per generator per hour)			25			


N
San Francisco Bay
Bay Aqueduct
Coloveras Res.
Palo Alto
Santa Clara
San Jose
Coyote Cr.
San Felipe Cr.
Lexington Res.
Anderson Lake
Gilroy
MILES
0
8
TARGET AREA BOUNDARY
GENERATOR
INACTIVE GENERATOR
1▲
2▲
3△
6▲
4▲
7▲
8△
9▲
11▲
12▲
13▲
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Project 30-72-1: CENTRAL SIERRA RESEARCH

Licensee: Fresno State College Foundation, Atmospheric Water Resources Research

Client: Same

Target Area: Watersheds of the Stanislaus and Mokelumne Rivers above a 5,000-foot elevation.

Purpose: Experimental weather modification for precipitation increase. (Program received continuing financial support of U. S. Bureau of Reclamation and service assistance from various other organizations.)

Active Agent: Silver iodide

Dispersal Methods: Surface, fixed, and mobile acetone and pyrotechnic generators. No aircraft activities occurred in the 1971-72 season, in contradistinction to previous years.

Generator No.	Generator Location	Elev.	Hours of Operation Dec.	Jan.	Feb.	Mar.	Apr.	Total
PG&E, Remote, Acetone Fixed, Ground[a]								
1	Dodge Ridge	7,360	49:40	15:30	22:17	15:45	10:30	113:42
2	Hammil Ridge	8,480	16:15	46:40	-	16:45	30:15	109:55
3	Mattley Meadow	7,840	19:15	7:00	-	-	8:00	34:15
4	Mt. Reba	7,680	158:03[b]	-	18:00[b]	-	-	176:03
5	Sapps Hill	7,300	35:13	49:48	19:29	16:45	31:15	152:30
6	Bennett Juniper	8,320	22:15[b]	-	9:45	-	115:00[b]	147:00
	Subtotal		300:41	118:58	69:31	49:15	195:00	733:25
PG&E, Remote, Pyrotechnic (20-gm Flares) Fixed, Ground[c]			Hours of Operation / No. of Flares					
1	Dodge Ridge	7,360	-	-	-	6:00 / 11	-	6:00 / 11
2	Hammil Ridge	8,480	-	-	-	6:00 / 17	-	6:00 / 17
5	Sapps Hill	7,300	-	-	-	6:00 / 8	-	6:00 / 8
6	Bennett Juniper	8,320	-	-	-	6:00 / 14	-	6:00 / 14
Subtotal						24:00 / 50		24:00 / 50

a/ Six generators supplied and operated by Pacific Gas and Electric Company under the direction of the Fresno State College Foundation burned a solution of silver iodide and sodium iodide (in acetone).

b/ Excess burn because of generator malfunction.

c/ These pyrotechnic generators were located at the sites of the acetone generators of the same location name.

Project 30-72-1
CENTRAL SIERRA RESEARCH
(Continued)

Generator	Burn rate per generator, in grams of silver iodide per hour	Burn time, in seconds	Silver iodide, in grams produced per unit	Nuclei produced per gram of silver iodide
Acetone				
PG&E	30	-	-	2×10^{13} @ -12° C
AWRR	Variable[a/]	-	-	2×10^{13} @ -12° C 5×10^{12} @ -8° C
Pyrotechnic				
20 gram	-	45	20	1×10^{13} @ -12° C
40 gram[b/]	-	210	46	1×10^{13} @ -12° C

Elapsed interval between pyrotechnic flares

Mobile Fixed	Variable 8 min. (approx.)

	Dec.	Jan.	Feb.	Mar.	Apr.	Total
AgI used (grams)	14,987	6,385	3,745	5,116	12,971	43,204
Number of storms seeded	6	2	2	3	4	17
Days on which seeded	15	5	4	5	10	39
Days on which seeded (excluding days of generator malfunction)	11	5	3	5	6	30

a/ Operation problems yielded a variable rate of burn.
b/ Two 20-gram flares burned 2 minutes apart.

Generator No.	Location	Elev.	Hours of Operation: Dec.	Jan.	Feb.	Mar.	Apr.	Total
			No. of Hours / No. Of 20-Gm Flares / No. of 40-Gm Flares					
1	Angels Camp	1,530	6:00 / 44 / 0	5:45 / 22 / 15	7:00 / 42 / 0	5:00 / 35 / 0	14:00 / 63 / 24	37:45 / 206 / 39
2	Sonora 11SSW	1,280	2:00 / 15 / 0	-	-	-	-	2:00 / 15 / 0
3	Groveland	3,200	11:00 / 64 / 0	10:30 / 60 / 0	5:00 / 32 / 0	5:00 / 34 / 0	18:00 / 111 / 13	49:30 / 301 / 13
4	Buck Meadows	3,010	6:00 / 39 / 0	1:00 / 5 / 0	-	-	-	7:00 / 44 / 0
5	Cherry Valley Dam	4,710	10:00 / 69 / 0	-	-	5:00 / 13 / 20	6:00 / 34 / 0	21:00 / 116 / 20
6	Leland Meadow	6,300	3:00 / 18 / 0	-	-	-	3:00 / 11 / 9	6:00 / 29 / 9
	Subtotal		38:00 / 249 / 0	17:15 / 87 / 15	12:00 / 74 / 0	15:00 / 82 / 20	41:00 / 219 / 46	123:15 / 711 / 81
AWRR, Pyrotechnic Mobile, Ground[a/]								
1	Pioneer	3,280	1:15 / 8 / 0	-	-	-	-	1:15 / 8 / 0
3	Avery Dump	3,650	4:15 / 19 / 0	-	-	-	1:00 / 4 / 0	5:15 / 23 / 0
5	Twain Harte Dump	3,550	1:00 / 6 / 0	1:30 / 10 / 1	-	-	2:30 / 8 / 0	5:00 / 26 / 1
7	Buck Meadow 10E	4,040	2:00 / 10 / 0	-	-	-	-	2:00 / 10 / 0
	Subtotal		8:30 / 45 / 0	1:30 / 10 / 1	-	-	3:30 / 12 / 0	13:30 / 67 / 1
			No. of Hours / AgI (grams)					
AWRR, Acetone, Mobile, Ground								
2	Arnold Fire Sta.	3,870	-	-	6:00 / 144	-	-	6:00 / 144
3	Avery Dump	3,650	-	1:00 / 25	-	1:30 / 42	7:00 / 129	9:30 / 196
4	Yankee Hill	3,730	-	-	-	-	1:30 / 30	1:30 / 30
5	Twain Harte Dump	3,550	-	5:15 / 111	-	2:00 / 50	9:00 / 190	16:15 / 351
6	2nd Garrotte Hill	3,350	3:45 / 60	-	2:00 / 36	2:00 / 50	-	7:45 / 146
8	Buck Meadow 5E	2,860	2:30 / 30	-	-	-	-	2:30 / 30
9	Smith Peak L. O.	3,870	-	5:00 / 100	-	2:15 / 57	14:45 / 224	22:00 / 381
	Groveland[b/]	3,200	-	-	-	-	5:00 / 54	5:00 / 54
	Angels Camp[b/]	1,530	-	-	-	-	3:30 / 35	3:30 / 35
	Subtotal		6:15 / 90	11:15 / 236	8:00 / 180	7:45 / 199	40:45 / 662	74:00 / 1367

a/ A solution in acetone of silver iodide and ammonium iodide burned.
b/ Acetone operations at a generator site of AWRR, pyrotechnic, fixed, of same name.

Project 32-72-1: LAKE TAHOE AND TRUCKEE RIVER BASIN

Licensee: Desert Research Institute

Client: Division of Atmospheric Water Resources Management, U. S. Bureau of Reclamation

Target Area: Lake Tahoe and Truckee River Watersheds

Purpose: Precipitation management research to increase inflow to Pyramid Lake

Active Agent: Silver Iodide

Dispersal Method: Ground-based generators:

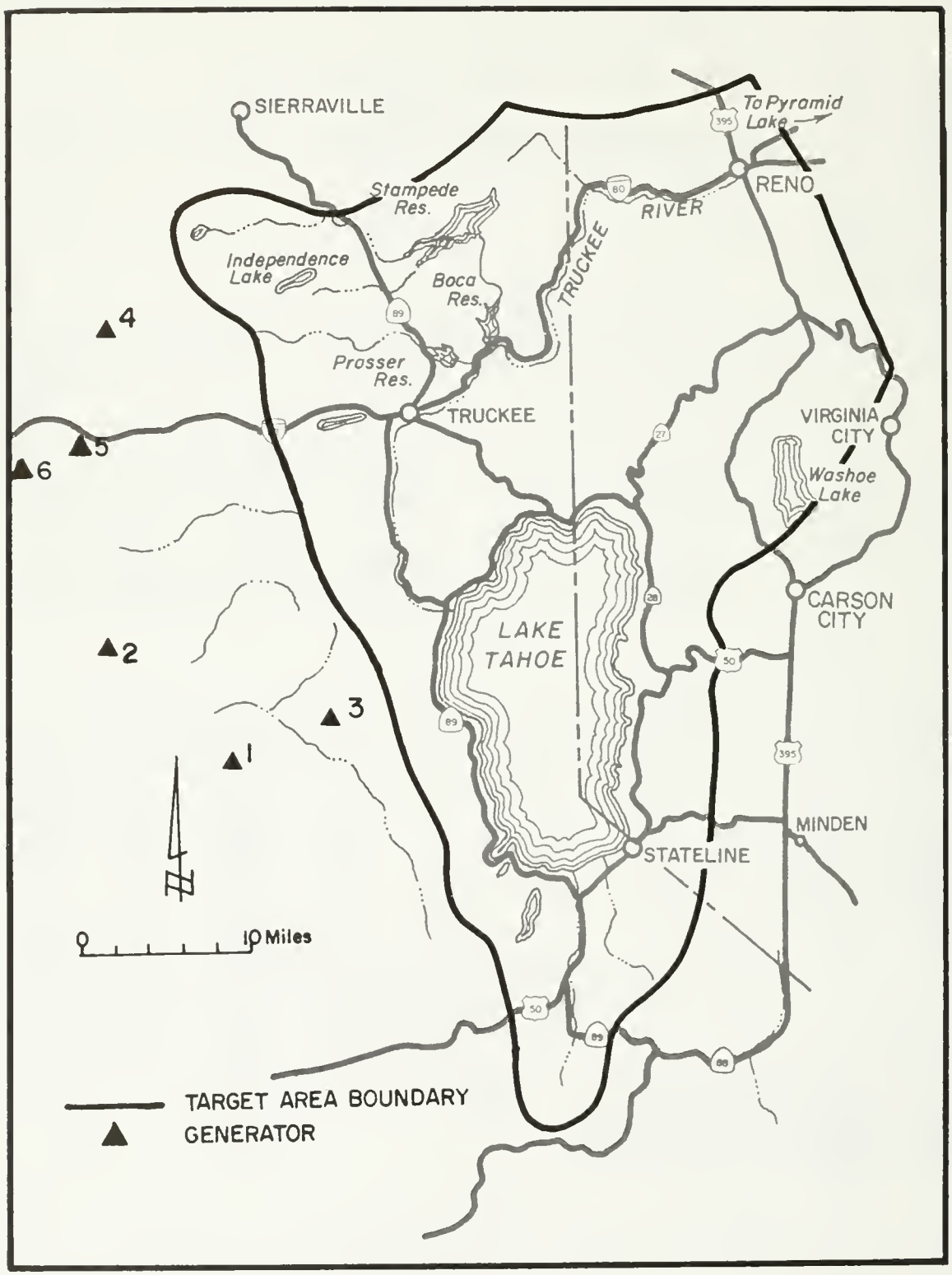
Generators 1 and 2, NAWC generator type (radio-controlled), burned a solution of silver iodide and ammonium iodide in acetone.

Generators 3 and 4, DRI-WM generator type (radio-controlled), burned a solution of silver iodide and ammonium iodide in acetone.

Generators 5 and 6, USBR II generator type (radio-controlled), burned a solution of silver iodide and isopropylamine in kerosene.

Generator No.	Location	Elev.	AgI used, in grams per hour per generator	Hours of Operation Nov.	Dec.	Jan.	Feb.	Mar.	April	Total
1	Bunker Hill[a]	7,524	3.7	15:55	0	0	46:27	24:00	69:05	155:27
2	Duncan Peak[a]	7,182	3.7	0	0	58:04	44:25	24:00	21:10	147:39
3	Barker Pass[b]	7,800	21.2	19:07	46:40	0	67:54	29:10	0	162:51
4	Meadow Lake[b]	7,400	21.2	20:00	0	0	0	0	0	20:00
5	Cisco Butte[c]	6,400	55.0	0	20:04	0	0	0	0	20:04
6	Blue Canyon[c]	5,300	55.0	0	39:39	80:50	91:17	24:12	68:41	304:39
	Total			55:02	106:23	138:54	250:03	101:22	158:56	810:40
AgI used (grams)				888.2	4,273.8	4,660.7	6,796.3	2,126.9	4,111.5	22,857.4
Number of storms				3	6	3	3	2	3	20
Number of days on which seeded				5	9	7	7	4	5	37

a/ NAWC generator type, radio-controlled
b/ DRI-WM generator type, radio-controlled
c/ USBR II generator type, radio-controlled


SIERRAVILLE
To Pyramid Lake
RENO
Stampede Res.
RIVER
TRUCKEE
Independence Lake
Boca Res.
Prosser Res.
TRUCKEE
VIRGINIA CITY
Washoe Lake
CARSON CITY
LAKE TAHOE
STATELINE
MINDEN
1
2
3
4
5
6
0
10 Miles
TARGET AREA BOUNDARY
GENERATOR

Project 34-72-1: UPPER AMERICAN RIVER

Licensee: Sacramento Municipal Utility District

Client: Same

Target Area: Upper American River Basin in eastern El Dorado County, north of U. S. Highway 50

Purpose: To increase water supply by increasing precipitation in the form of snow

Active Agent: Silver iodide

Dispersal Method: Ground-based generators* burning a solution of silver iodide and ammonium iodide in acetone

* Located in same positions as in 1970-1971 season, except Generator No. 6 at Fresh Pond, which was moved to Granite Spring on Peavine Ridge.

Generator No.	Location	Elev.	Hours of Operation Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
1	Big Hill	6,125	19:00	142:50	43:50	66:50	24:20	87:15	383:15
2	Robbs Saddle	5,725	10:00	155:00	54:25	65:00	22:20	66:15	372:00
3	West Peavine	5,020	23:50	158:45	49:50	68:45	11:15	92:20	404:45
4	Log Deck	5,225	24:00	155:00	48:50	68:40	11:00	88:35	396:05
5	Kyburz	3,975	21:45	152:15	51:40	65:55	9:50	91:30	392:55
6	Granite Spring	5,750	25:20	164:00	51:15	68:00	10:40	88:40	407:55
	TOTAL (to the nearest 5 min.)		123:55	927:50	299:00	403:10	89:25	513:35	2,356:55
	Number of storms		4	10	3	4	4	3	28
	Days on which seeded		2	11	4	5	3	7	32
	AgI used (grams)		3,098	23,196	7,475	10,079	2,235	12,840	58,923
	Rate of dispersal (grams per hour per generator)		25.0						

California. Dept. of Water Resources.
Bulletin.